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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/528,137

12/12/2005

Takashi Ozaki

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EXAMINER

MACARTHUR, SYLVIA

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

12/14/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/528,137

Applicant(s)

OZAKI ET AL.

Examiner

Sylvia R. MacArthur

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 August 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 9-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 18-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/17/2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 3/17/2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

Election/Restrictions

1. Applicant's election without traverse of claims 1-8 and 18-20 in the reply filed on 8/27/2007 is acknowledged.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-8, 18, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Sato et al (EP 1152461).

Sato et al teaches a heat treatment boat.

Regarding claim 1: A substrate processing apparatus comprising: a reaction furnace for processing a substrate; a seal cap 18 for sealing the reaction furnace hermetically (see discussion of magnetic seal 14 in [0040]) ; a cover 12 installed separately from the seal cap so as to cover at least a section of the surface of the seal cap facing the inner side of the reaction furnace; a small chamber formed at least by the seal cap and the cover; a feed opening for supplying a first gas 28 to the small chamber; a flow outlet provided in the small chamber for making the first gas flow into the reaction furnace; and a feed opening provided further downstream than the flow outlet,

for supplying a second gas 30 into the reaction furnace, see Figs. 1 and 7, and see for examples pages 4-10. Note that broadly interpreted, that cap 18 could also be interpreted as the cover 12 and vice versa as the claims do not recite where the specific location of the cover or cap is relative to one another. Such that the cover could also be seen as 18 and cap 12.

Regarding claim 2: The substrate processing apparatus according to claim 1, wherein the small chamber is formed by the seal cap and the cover and the inner wall surface of the reaction furnace; and the flow outlet is formed by a clearance between the cover and the inner wall surface of the reaction furnace see Figs. 1 and 7.

Regarding claim 3: The substrate processing apparatus according to claim 2, wherein the reaction furnace includes a process tube, and a furnace opening flange for supporting the process tube; and the small chamber is formed by the seal cap and the cover and the inner wall surface of the furnace opening flange; and the flow outlet is formed by a clearance between the inner wall surface of the furnace opening flange and the cover, see Figs. 1 and 7.

Regarding claim 4: The substrate processing apparatus according to claim 3, wherein the furnace opening flange includes an inlet flange for supporting the process tube, and a base flange for supporting the inlet flange; and the small chamber is formed by the inner wall surface of the base flange and the cover and the seal cap; and the flow outlet is formed by a clearance between the inner wall surface of the base flange and the cover, see Figs. 1 and 7.

Regarding claim 5: The substrate processing apparatus according to claim 4, wherein the feed opening for supplying the first gas is provided in the base flange; and the feed opening for supplying the second gas is provided in the inlet flange, see Figs. 1 and 7.

Regarding claim 6: The substrate processing apparatus according to claim 1, wherein the cover is formed by a plate-shaped member, see Figs. 1 and 7.

Regarding claim 7: The substrate processing apparatus according to claim 1, comprising a boat 10 for holding multiple substrates approximately horizontally at intervals in multiple stages, and a rotation mechanism for supporting and rotating the boat by way of a rotating shaft 16 penetrating through the seal cap, wherein the cover is installed in the rotating shaft, see col. 6 of page 4.

Regarding claim 8: The substrate processing apparatus according to claim 1, wherein the first gas is ammonia, the second gas is dichlorosilane, and a silicon nitride film is formed on the substrate by the thermal CVD method in the processing, the invention is held to an apparatus, the supplies of Sato et al are inherently capable of supplying the gases listed in the claim as what specific gas is supplied does not structurally limit the prior art of Sato et al, note NH₃ is listed in [0034].

Regarding claim 18: A semiconductor device manufacturing method comprising the steps of: loading a substrate into a reaction furnace; sealing the reaction furnace hermetically with a seal cap; processing the substrate by supplying a first gas into a small chamber formed by the seal cap and a cover installed separately from the seal cap so as to cover at least a section of the surface of the seal cap facing the inner side of the reaction furnace, along with making the first gas flow into the reaction furnace from a flow outlet provided in the small chamber, and supplying a second gas into the reaction furnace from a second feed opening provided further downstream

than the flow outlet; and unloading the substrate from the reaction furnace, see pages 4-10 of Sato et al.

Regarding claim 19: A semiconductor device manufacturing method comprising the steps of: loading a substrate into a reaction furnace; sealing the reaction furnace hermetically with a seal cap; processing the substrate by supplying a first gas into a small chamber formed by the seal cap and a first cover installed separately from the seal cap so as to cover at least a section of the surface of the seal cap facing the inner side of the reaction furnace, along with allowing the first gas to flow into the reaction furnace from a flow outlet provided in the small chamber, supplying a second gas into a second small chamber formed by the inner surface of the lower section of the reaction furnace and a second cover installed separately from the inner surface of the lower section of the reaction furnace so as to cover at least a section of the inner surface of the lower section of the reaction furnace, and allowing the second gas to flow into the reaction furnace from a second flow outlet provided in the second chamber; and unloading the substrate from the reaction furnace, see pages 4-10 of Sato et al.

4. Claims 1-8, 18, and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Kogano et al (US 2002/0094502).

Kogano et al teaches a heat treatment boat.

Regarding claim 1: A substrate processing apparatus comprising: a reaction furnace A for processing a substrate; a seal cap 17 for sealing the reaction furnace hermetically (see discussion of o-ring 11) ; a cover 19 installed separately from the seal cap so as to cover at least a section of the surface of the seal cap facing the inner side of the reaction furnace; a small chamber formed

at least by the seal cap and the cover; a feed opening for supplying a first gas 4A to the small chamber; a flow outlet provided in the small chamber for making the first gas flow into the reaction furnace; and a feed opening provided further downstream than the flow outlet, for supplying a second gas 10 into the reaction furnace, see Figs.1, and 3-6 , and see for example the abstract and pages 2-7 Note that broadly interpreted, that cap 17 could also be interpreted as the cover 19 and vice versa as the claims do not recite where the specific location of the cover or cap is relative to one another. Such that the cover could also be seen as 17 and cap 19.

Regarding claim 2: The substrate processing apparatus according to claim 1, wherein the small chamber is formed by the seal cap and the cover and the inner wall surface of the reaction furnace; and the flow outlet is formed by a clearance between the cover and the inner wall surface of the reaction furnace see Figures.

Regarding claim 3: The substrate processing apparatus according to claim 2, wherein the reaction furnace includes a process tube, and a furnace opening flange for supporting the process tube; and the small chamber is formed by the seal cap and the cover and the inner wall surface of the furnace opening flange; and the flow outlet is formed by a clearance between the inner wall surface of the furnace opening flange and the cover, see Figures.

Regarding claim 4: The substrate processing apparatus according to claim 3, wherein the furnace opening flange includes an inlet flange for supporting the process tube, and a base flange for supporting the inlet flange; and the small chamber is formed by the inner wall surface of the base flange and the cover and the seal cap; and the flow outlet is formed by a clearance between the inner wall surface of the base flange and the cover, see Figures.

Regarding claim 5: The substrate processing apparatus according to claim 4, wherein the feed opening for supplying the first gas is provided in the base flange; and the feed opening for supplying the second gas is provided in the inlet flange, see Figs. 1 and 7.

Regarding claim 6: The substrate processing apparatus according to claim 1, wherein the cover is formed by a plate-shaped member, see Figures.

Regarding claim 7: The substrate processing apparatus according to claim 1, comprising a boat 19 for holding multiple substrates approximately horizontally at intervals in multiple stages, and a rotation mechanism for supporting and rotating the boat by way of a rotating shaft 18 penetrating through the seal cap, wherein the cover is installed in the rotating shaft, see [0029].

Regarding claim 8: The substrate processing apparatus according to claim 1, wherein the first gas is ammonia, the second gas is dichlorosilane, and a silicon nitride film is formed on the substrate by the thermal CVD method in the processing, the invention is held to an apparatus, the supplies of Sato et al are inherently capable of supplying the gases listed in the claim as what specific gas is supplied does not structurally limit the prior art of Kogano et al.

Regarding claim 18: A semiconductor device manufacturing method comprising the steps of: loading a substrate into a reaction furnace; sealing the reaction furnace hermetically with a seal cap; processing the substrate by supplying a first gas into a small chamber formed by the seal cap and a cover installed separately from the seal cap so as to cover at least a section of the surface of the seal cap facing the inner side of the reaction furnace, along with making the first gas flow into the reaction furnace from a flow outlet provided in the small chamber, and supplying a second gas into the reaction furnace from a second feed opening provided further downstream

than the flow outlet; and unloading the substrate from the reaction furnace, see Figures and entirety of Kogano et al.

Regarding claim 19: A semiconductor device manufacturing method comprising the steps of: loading a substrate into a reaction furnace; sealing the reaction furnace hermetically with a seal cap; processing the substrate by supplying a first gas into a small chamber formed by the seal cap and a first cover installed separately from the seal cap so as to cover at least a section of the surface of the seal cap facing the inner side of the reaction furnace, along with allowing the first gas to flow into the reaction furnace from a flow outlet provided in the small chamber, supplying a second gas into a second small chamber formed by the inner surface of the lower section of the reaction furnace and a second cover installed separately from the inner surface of the lower section of the reaction furnace so as to cover at least a section of the inner surface of the lower section of the reaction furnace, and allowing the second gas to flow into the reaction furnace from a second flow outlet provided in the second chamber; and unloading the substrate from the reaction furnace, see Figures and entirety of Kogano et al.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al or Kogano et al in view of Ide Shigeaki (JP 11-121389).

The teachings of Sato et al or Kogano et al were discussed above. Both Sato et al and Kogano et al fail to teach a third gas.

The prior art of Shigeaki teaches a vertical type diffusion furnace and diffusion method according to the Computer Generated English Translation (provided herewith by the Examiner). According to the English Abstract note a first gas injector 11, a second gas injector 12 and a third gas injector 13. The motivation to provide a third gas flow is that a plurality of process gases is conventionally known. Furthermore, the teachings of Shigeaki teach that the gases are introduced independently. This allows for better control of the flow of the gases individually and leads a more desirable and reproducible process result.

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wada et al (US 5,162,047) teaches vertical furnace see Fig.2.

Imai et al (US 5,482,559) teaches a heat treatment boat see Fig. 8.

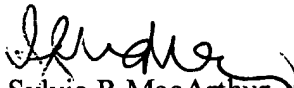
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-Th during the hours of 8 a.m. and 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Sylvia R MacArthur
Primary Examiner
Art Unit 1792

November 26, 2007